



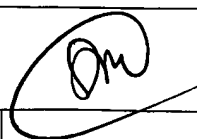
# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/667,496	09/23/2003	Naoto Iwao	117272	1922
25944	7590	06/14/2005	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			GARCIA JR, RENE	
			ART UNIT	PAPER NUMBER
			2853	

DATE MAILED: 06/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/667,496	Applicant(s) IWAQ ET AL.	
	Examiner Rene Garcia, Jr.	Art Unit 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 23 September 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>05 January 2004</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: Paragraph 0062 Reference 7E and Paragraph 0077 Reference 102. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: Figure 12 Reference 102a and 120. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are

Art Unit: 2853

not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 3, 5, 6, 8, 10, 11, 13 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi (US 6,099,103).

Takahashi discloses with respect to claim 1:

An inkjet printing apparatus (Col. 1, Line 10),

A plurality of pressure chambers */ink chambers/ 613* (Col. 1, Line 47) each having one end connected to a nozzle *618* (Col. 1, Line 46);

Actuator */actuator wall/603* (Col. 1, Line 49) that can take two states of a first state *613* (Col. 1, Line 64) wherein the volume of a pressure chamber is  $V_1$ , and a second state *613c* (Col. 1, Lines 65-66) wherein the volume of the pressure chamber is  $V_2$  larger than  $V_1$  (Col. 2, Lines 3-4);

An actuator controller *625* (Col. 1, Line 59) for supplying a voltage pulse (Col. 1, Line 61) to the actuator *603* to change a state of the actuator from the first state *613* to the second state *613c* and then to the first state *613* again so that ink is ejected through the nozzle *618* (Col. 2, Line 29),

A pulse width  $T_w$  of the voltage pulse being shorter */0.3T pulse width/* (Col. 4, Lines 23 – 24, “pulse width of approximately 0.3T to 1.0T”) than a pulse width  $T_{max}$  */1.0T/* at which a

Art Unit: 2853

maximum ejection speed of ink ejected from the nozzle **618** (Col. 1, Line 46) is obtained (Col. 2, Lines 7 – 8 “one-way propagation time  $T$  of a pressure wave in the ink chamber”).

Takahashi discloses with respect to claim 3:

Inkjet printing apparatus (Col. 1, Line 10): A plurality of pressure chambers */ink chamber/* **613** (Col. 1, Line 47) each having one end connected to a nozzle **618** (Col. 1, Line 46);

An actuator */actuator wall/* **603** (Col. 1, Line 49) that can take two states of a first state **613** (Col. 1, Line 64) wherein the volume of a pressure chamber is  $V_1$ , and a second state **613c** (Col. 1, Lines 65-66) wherein the volume of the pressure chamber is  $V_2$  larger than  $V_1$  (Col. 2, Lines 3-4);

And an actuator controller **625** (Col. 1, Line 59) for changing a state of the actuator **603** from the first state **613** to the second state **613c** and then to the first state **613** again so that ink is ejected through the nozzle **618** (Col. 2, Lines 29),

The actuator controller **625** controlling a time period  $T_w$   $W_A$  (Col. 9, Lines 4-5) from a timing  $T_1$  when the actuator **603** starts to change from the first state **613** to the second state **613c** until a timing  $T_2$  when the actuator starts to change from the second state **613c** to the first state **613** (Col 12, Lines 23-29; defines the leading (rising) edge of Signal A to be  $T_1$  and the trailing (falling) edge to be  $T_2$ ) to be shorter */0.5T pulse signal/* than a pulse width  $T_{max}/1.0T/$  (Col. 2, Lines 7 – 8 “one-way propagation time  $T$  of a pressure wave in the ink chamber”; Col. 9, Lines 4-5 “jet pulse signal is set between  $0.5T$  and  $1.5T$ ”) at which a maximum ejection speed of ink ejected from the nozzle **618** (Col. 2, Line 29) is obtained.

Art Unit: 2853

Takahashi further discloses with respect to claim 5:

The inkjet printing apparatus (Col. 1, Line 10) wherein the actuator controller **625** (Col. 1, Line 59) supplies:

A voltage pulse (Col. 1, Line 61) to the actuator */actuator wall/* **603** (Col. 1, Line 49) to change a state of the actuator from the first state **613** (Col. 1, Line 64) to the second state **613c** (Col. 1, Lines 65-66) and then to the first state **613** (Col. 1, Lines 62-64, Col. 2 Lines 21-23; voltage applied the volume increases [state 1 to state 2], then voltage returns to 0 [V] and actuator walls return to original state [back to first state]) again so that ink is ejected through the nozzle **618** (Col. 2, Lines 29).

Takahashi further discloses with respect to claim 8 and claim 13:

Actuator controller **625** (Col. 1, Line 59) and method for controlling the drive of an actuator */actuator wall/* **603** included in an inkjet printing apparatus (Col. 1, Line 10);

A plurality of pressure chambers */ink chambers/* **613** (Col. 1, 47) each having one end connected to a nozzle **618** (Col. 1, Line 46), the actuator **603** being able to take two states of a first state **613** (Col. 1, Line 64) wherein the volume of a pressure chamber is V1, and a second state **613c** (Col. 1, Lines 65-66) wherein the volume of the pressure chamber is V2 larger than V1 (Col. 2, Lines 3-4),

The actuator controller **625** changing a state of the actuator **603** from the first state **613** to the second state **613c** and then to the first state **613** again so that ink is ejected through the nozzle **618**.

The actuator controller **625** controlling a time period  $T_w$   $W_A$  (Col. 9, Lines 4-5) from a timing T1 when the actuator **603** starts to change from the first state **613** to the second state **613c**,

Art Unit: 2853

until a timing T2 when the actuator **603** starts to change from the second state **613c** to the first state **613** (Col. 12, Lines 23-29; defines the leading (rising) edge of Signal A to be T1 and the trailing (falling) edge to be T2), to be shorter/*0.5T pulse signal*/ than a pulse width Tmax/*1.0T*/ (Col. 2, Lines 7-8 “one-way propagation time T of a pressure wave in the ink chamber”; Col. 9, Lines 4-5 “jet pulse signal is set between 0.5T and 1.5T”) at which a maximum ejection speed of ink ejected from the nozzle **618** (Col. 1, Line 46) is obtained.

Takahashi further discloses with respect to claim 10 and claim 15:

The actuator controller **625** (Col. 1, Line 59) wherein the actuator controller **625** supplies:

A voltage pulse (Col. 1, Line 61) to the actuator */actuator wall/ 603* (Col. 1, Line 49) to change a state of the actuator from the first state **613** (Col. 1, Line 64) to the second state **613c** (Col. 1, Lines 65-66) and then to the first state **613** (Col. 1, Lines 62-64, Col. 2 Lines 21-23; voltage applied the volume increases [state 1 to state 2], then voltage returns to 0 [V] and actuator walls return to original state [back to first state]) again so that ink is ejected through the nozzle **618** (Col. 2, Lines 29).

Takahashi further discloses with respect to claim 11:

A method of controlling the drive of an actuator */actuator wall/ 603* (Col. 1, Line 49) included in an inkjet printing apparatus (Col. 1, Line 10):

Plurality of pressure chambers */ink chambers/ 613* (Col. 1, Line 47) each having one end connected to a nozzle **618** (Col. 1, Line 46), the actuator **603** being able to take two states of a first state **613** (Col. 1, Line 64) wherein the volume of a pressure chamber is V1, and a second state **613c** (Col. 1, Lines 65-66) wherein the volume of the pressure chamber is V2 larger than V1 (Col. 2, Lines 3-4), a state of the actuator **603** changing from the first state **613** to the second

Art Unit: 2853

state **613c** (Col. 1, Lines 65-66) and then to the first state **613** (Col. 1, Line 64) again so that ink is ejected through the nozzle **618** (Col. 2, Line 29),

The method comprising a step of supplying a voltage pulse (Col. 1, Line 61) to the actuator **603** /*actuator wall*/ **603** (Col. 1, Line 49), the voltage pulse (Col. 1, Line 61) having a pulse width  $T_w$  shorter /*0.3T pulse width*/ (Col. 4, Lines 23 – 24, “pulse width of approximately 0.3T to 1.0T”) than a pulse width  $T_{max}$  /*1.0T*/ (Col. 2, Lines 7-8, “one-way propagation time T of a pressure wave in the ink chamber”) at which a maximum ejection speed of ink ejected from the nozzle is obtained.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 7 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi (US 6,099,103).

Takahashi discloses the following with respect to claims 2, 7 and 12:

Pulse width ranging from 0.3  $T_{max}$  (Col. 2, Lines 7-8, “one-way propagation time T of a pressure wave in the ink chamber”) to 1.0  $T_{max}$  (Col. 4, Lines 23-24).

Takahashi does not disclose the following:

Range of the voltage pulse is not less than 0.7  $T_{max}$  and not more than 0.8  $T_{max}$ .

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a voltage pulse range of 0.7  $T_{max}$  to 0.8  $T_{max}$ , for the purpose of

Art Unit: 2853

reduction in size of the ejected ink droplet and obtain good print results. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. **In re Aller, 105 USPQ 233. Range**

Claims 4, 9 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi (US 6,099,103).

Takahashi discloses the following with respect to claims 4, 9 and 14:

Time period  $T_w$   $W_A$  (Col. 9, Lines 4-5) from timing T1 when the actuator /*actuator wall*/ **603** ((Col. 1, Line 49) starts to change from the first state **613** (Col. 1, Line 64) to the second state **613c** (Col. 1, Lines 65-66) until the timing T2 (Col. 12, Lines 23-29; defines the leading [rising] edge of Signal A to be T1 and the trailing [falling] edge to be T2) when the actuator **603** starts to change from the second state **613c** to the first state **613** ranging from 0.5  $T_{max}$  (Col. 2, Lines 7-8, "one-way propagation time T of a pressure wave in the ink chamber") to 1.5  $T_{max}$  (Col. 9, Lines 4-5).

Takahashi does not disclose the following:

Pulse width is not less than 0.7  $T_{max}$  and not more than 0.8  $T_{max}$ .

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a voltage pulse range of 0.7  $T_{max}$  to 0.8  $T_{max}$ , for the purpose of reduction in size of the ejected ink droplet and obtain good print results. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. **In re Aller, 105 USPQ 233. Range**

### ***Conclusion***

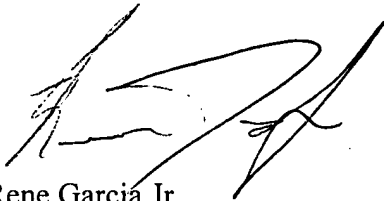
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Takahashi (US 5,736,994) discloses a method of driving an ink-jet apparatus comprising an ink chamber filled with ink, and actuator for changing the volume of the ink chamber, and a control unit which causes a pressure wave to develop in the ink chamber by applying a first pulse signal to the actuator so as to increase the volume of the ink chamber, and which causes the volume of the ink chamber to be decreased from the increased state to the original state after a lapse of time T. Ishikawa (US 6,350,003) discloses an ink droplet ejecting method and apparatus, wherein, after a driving waveform for a primary ejection of ink, only one additional pulse is added, thereby making it possible to obtain an ink droplet of a desired volume.

Art Unit: 2853

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rene Garcia, Jr. whose telephone number is (571) 272-5980. The examiner can normally be reached on M-F 7:00AM - 4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rene Garcia Jr.  
15 May 2005



K. PEGGINS  
PRIMARY EXAMINER

4/85